

*Preliminary Note on the Occurrence of a New Variety of
Trypanosomiasis on the Island of Zanzibar.*

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Neither on Zanzibar nor on the adjacent island of Pemba has the occurrence of trypanosomiasis among animals ever been recorded or suspected. The population of Zanzibar, about 170,000, consists mostly of natives. There is a considerable proportion of Indians, and a very small number of Europeans. Horses are comparatively few in number, but there are many donkeys, mules, cattle and goats. Donkeys and mules are largely obtained from the East; cattle and goats are imported mainly from the mainland of Africa, while horses have been obtained from various countries.

The island itself is of coral formation and has much swampy ground. Apart from mosquitoes, there are very few blood-sucking flies: neither Tsetse flies nor Stomoxys have been found.

On February 9, 1908, Mr. Dubash, an Indian veterinary officer attached to the Sultan's stables, noticed, in a livery stable belonging to an Indian, a horse which showed well-marked swelling of the abdomen and sheath. He at once drew my attention to it, when the animal was made the subject of investigation.

The animal was a bay Arab, entire, aged. It showed evident signs of weakness, while its temperature was 103°·6 F. The front of the chest, forelegs, abdomen, sheath and hind legs, all showed evidence of œdematous swelling. The conjunctivæ and Schneiderian membrane were pale, but no petechiæ were observable. No other horse in the stable showed any evidence of being similarly affected.

Blood was drawn from the ear and also directly from the jugular vein. With this blood, films were prepared for microscopical examination. On examination, the red corpuscles were found to be very markedly vacuolated, and among these were found some very small trypanosomes. Their number was, however, so small that considerable care had to be taken in searching for them, and it may be at once said that at no time were they ever very numerous.

Emaciation, which was already marked in the horse, progressed until death, which occurred on February 18.

Post-mortem Examination.

No petechiæ were observable on the conjunctivæ, nor on the Schneiderian membrane, but both were hyperæmic. On removing the skin from the dependent portion of the thorax and abdomen, yellow solidified cedematous material was found, about an inch in thickness, which extended from the sternum to the hind legs.

The blood was pale in colour, but the coagulation power was little, if at all, diminished.

Muscles.—These were pale in colour and somewhat atrophied.

Lungs.—These organs were slightly cedematous and pale in colour; a moderate amount of hypostatic congestion was seen on one side.

Heart.—The contents of the pericardium were not determinable, as the cavity had been accidentally opened during dissection. Both the epi- and the endocardium showed numerous petechial hæmorrhages, varying in size from a pin-point to patches a quarter of an inch in diameter. On the outside they were most numerous near the interventricular groove, and on the inner side at, and around, the attachments of the chordæ tendineæ.

Liver.—The organ was fairly normal in size, cedematous in consistence, and almost normal in colour.

Spleen.—This organ was only slightly enlarged, pale on section, and of fair consistence.

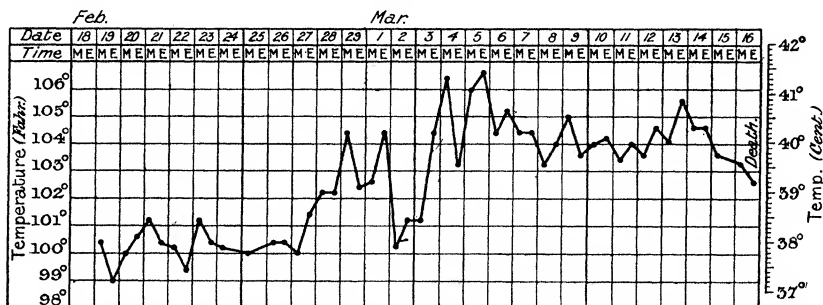
Lymphatic Glands.—These were enlarged and cedematous.

No other organ called for special remark.

Inoculation Experiments.

Owing to the difficulty experienced in obtaining animals, the various animals dealt with were not all inoculated on the same date.

Horse.—A horse was injected intravenously with 5 c.c. of the blood of the infected horse on February 18, 1908. The temperature of the animal



Horse.—Inoculated by intravenous injection of 5 c.c. fresh blood of infected horse on February 18, 1908.

began to rise on the evening of February 27, but already, on February 25 trypanosomes, few but very lively, had been observed in the blood.

On February 28 they were fairly numerous and at their maximum, since from this time up till March 8 they appeared in very few numbers. On March 2 the sheath of the penis and the scrotum were much swollen, and on March 4 the animal was obviously sick, standing with head down and refusing food. By March 7, however, the scrotal swelling was almost entirely reduced; trypanosomes had disappeared from the blood, and the animal looked much better. I left by steamer for England on the morning of March 8, and am indebted for the subsequent history to members of the staff of the Health Department. The improvement noted previous to my departure had been merely transient, since emaciation still progressed with some fever, and the animal died on March 16.

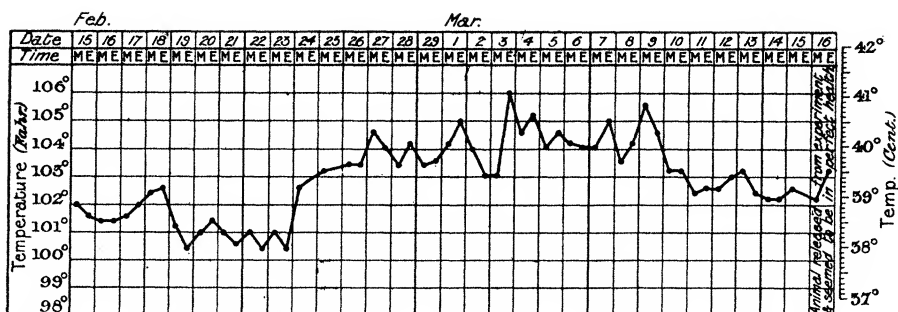
At the *post-mortem* examination solidified yellow oedematous material had been found under the skin. The spleen and liver are said to have been congested.

Donkey.—This animal was injected intravenously with 3 c.c. of the blood of the infected horse on February 14. Within the three days subsequent to this operation, the temperature was above normal, but this is probably to be accounted for by the change of diet and its usual surroundings. From this time onward nothing abnormal was observed, nor was anything of the nature of fever seen. It was discharged from experiment on March 16, when it seemed to be in perfect health. No trypanosomes were seen in its blood at any time.

Dog.—A small pariah dog was inoculated by subcutaneous injection with 3 c.c. of infected blood on February 14. Examinations of its blood were frequently made, but no trypanosomes were seen at any period up till the time of my departure for England, and the animal was discharged from experiment on March 10, when it seemed in perfect health. It has to be noted that the inoculation in this case was by subcutaneous injection, and it is very possible that infection might have been made had some other means of inoculation been used.

Goat.—A goat was inoculated by intravenous injection with 3 c.c. of infected blood of the horse, on February 14. During the first four days the temperature was slightly above the normal, and then subsided. On February 24, however, it began to rise, and attained a maximum on March 3, when it had reached to 106° F.

During the subsequent four days it was steadily falling. At no period were trypanosomes ever found in the blood, nor did the animal at any stage ever show visible signs of any indisposition.



Goat.—Inoculated by intravenous injection of 3 c.c. of fresh blood of infected horse on February 14, 1908.

Ox.—A young ox was inoculated by intravenous injection with 3 c.c. of the blood of the infected horse on February 14. The temperature of the animal was never elevated. From February 20 until the 22nd of the same month it underwent a descent, reaching to 99°, but had again regained the usual mean, about 102°, on February 25. Trypanosomes appeared in the blood on February 27, were fairly numerous by March 2, after which they became few in numbers. The animal never showed the slightest sign of illness.

Monkey.—A small grey monkey was inoculated by subcutaneous injection on March 2 with 2 c.c. of the blood of the ox which, at this time, showed numerous trypanosomes. The monkey was then taken on board the ship with me and seemed in fairly good health throughout the voyage. Nothing was observed in any way abnormal until the morning of May 17, when it suddenly became affected with abdominal pain and passed into violent tremors. Convulsive seizures were then observed, with biting movements somewhat epileptiform in character, and within a couple of hours the animal died. On making *post-mortem* section the blood was found to be somewhat thin in character. There was some acute peritonitis. The spleen was pale in colour and slightly enlarged while the lower end was dark in colour. This dark portion was clearly delimited from the rest of the organ. No other abnormal condition was observed. On examination of the blood, chains of streptococci were observed but not very numerous. No trypanosomes were ever observed in this animal.

Guinea-pigs.—One was inoculated by subcutaneous injection on February 10 with about 1 c.c. of the blood of the infected horse and again on March 2 with 2 c.c. of the blood of the ox, which at this time showed numerous trypanosomes.

One was injected intraperitoneally on February 18 with 1 c.c. of the blood of the infected horse and the operation was repeated on March 2, using 2 c.c. of the blood of the ox. Trypanosomes were not observed at any period up

to March 8. The former animal died at sea during a heavy gale, while the other was sent to the Brown Institute after my arrival in London on April 6.

Rabbits.—One was injected intraperitoneally with 2 c.c. of the blood of the ox on March 2 while the other was injected, at the same time, with 2 c.c. of the same blood, subcutaneously.

The subcutaneously injected rabbit was despatched from the port of Marseilles to M. Mesnil, at the Pasteur Institute in Paris, and I have had the pleasure of several reports from him on the matter. It would seem that no trypanosomes have ever appeared in that animal, which remains still in good health. The intraperitoneally injected animal was taken by me to the Brown Institute and there I found several trypanosomes in the blood. They were, however, extremely few and appeared very sluggish as compared with those seen in the horses and the ox.

Rats.—Two large grey rats were fed with infected horse blood on February 14 but never seemed to have become infected.

Description of the Trypanosome.

Its length as seen in the blood of the horses appeared to be from $13\ \mu$ to $16\ \mu$, the mean being $15\ \mu$. The breadth measured from $0.75\ \mu$ to $1.25\ \mu$, the mean being $1\ \mu$. The blunt end is sometimes rounded but in many it tapers to a sharp point.

The nucleus is placed about $4\ \mu$ from the blunt end and measures from $2\ \mu$ to $3\ \mu$ in length, being most usually about $2\ \mu$. The breadth approximates to $1\ \mu$ but extremes may be found from $0.75\ \mu$ to $1.25\ \mu$.

The thickness of the parasite is usually greatest between the centrosome and the nucleus. The centrosome, which rarely showed evidence of division, is placed close to the blunt extremity; sometimes a space about $1\ \mu$ in extent intervenes between it and the actual extremity.

In size, this trypanosome somewhat resembles the *T. dimorphon*, but is smaller and rather more delicate. M. Mesnil, who has kindly given me his opinion on the parasite, confirms me in this view, and states that he also considers it as being different from the *T. congolense*, which latter M. Laveran considers as distinct from the *T. dimorphon*.

On my arrival in London, the infected guinea-pig, rabbit, and monkey were placed under the charge of Professor Rose Bradford, who kindly arranged to have further investigation made of this interesting parasite. I take this opportunity of expressing my thanks to him for his kind assistance.
